Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for highly sensitive imaging, comprising:

providing a substrate;

forming an epitaxial layer on the substrate;

in the epitaxial layer, forming a first well extending from the surface of the epitaxial layer into the epitaxial layer and defined by one or more walls and a floor, wherein said floor is disposed in the epitaxial layer and spaced from the substrate said first well is of a first polarity type and

~~forming a first well of a first polarity type~~ wherein the first well is formed ~~on an epitaxial layer of the first polarity type~~ such that an intervening epitaxial material of the first polarity type exists between the floor and the adjacent walls of the first well; and

forming a diode electrode structure of a second polarity type that is opposite the first polarity type wherein the diode electrode structure is one of an active diffusion layer of the second polarity formed on the intervening epitaxial material and a second well of the second polarity type formed within the intervening epitaxial material wherein the diode electrode structure is formed such that a first portion of the intervening epitaxial material is between the electrode structure and the first well and the relative doping concentration of the first and second wells are sized to generate a depletion region in the epitaxial layer extending laterally beneath the floor of the first well.

2. (Original) The method of claim 1, further comprising minimizing the capacitance of the diode electrode structure in accordance with the equation:

$$S \propto A_{eff} \cdot QE_{optimized} \cdot \frac{q}{C_{\min imized}}$$

where S is the sensitivity of a pixel, A_{eff} is the effective photosensitive area of the pixel, QE is the quantum efficiency of the pixel, q is the charge of an electron, and C is the capacitance of the diode structure.

3. (Original) The method of claim 1, further comprising applying a bias voltage across the first well and the diode electrode structure.

4. (Original) The method of claim 3, further comprising exposing a top surface of the intervening epitaxial material to light.

5. (Original) The method of claim 1, wherein the top surface of the intervening epitaxial material forms a continuous area surrounding the electrode structure.

6. (Original) The method of claim 1, wherein the intervening epitaxial material is contained within the first well.

7. (Original) The method of claim 1, wherein the epitaxial layer is formed on a P+ substrate.

Claims 8-20. (Canceled)

21. (New) The method of claim 1 wherein the heavily doped layer in the substrate is heavily doped with a first polarity type.

22. (New) A method for highly sensitive imaging, comprising:

providing a substrate doped with a layer heavily doped with a first polarity type;

forming an epitaxial layer on the substrate lightly doped with said first polarity type;

in the epitaxial layer, forming a first well extending from the surface of the epitaxial layer into the epitaxial layer and defined by one or more walls and a floor, wherein said floor is spaced from the heavily doped layer in the substrate said first well is more heavily doped with a first polarity type than the

epitaxial layer such that an intervening epitaxial material of the first polarity type exists between the adjacent walls of the first well and separates the floor of the first well from the heavily doped layer in the substrate; and

forming a diode electrode structure of a second polarity type that is opposite the first polarity type wherein the diode electrode structure is one of an active diffusion layer of the second polarity formed on the intervening epitaxial material and a second well of the second polarity type formed within the intervening epitaxial material wherein the diode electrode structure is formed such that a first portion of the intervening epitaxial material is between the electrode structure and the first well and a second portion of the intervening epitaxial material is between the second well and the heavily doped layer in the substrate.

23. (New) The method of claim 22 wherein the heavily doped layer in the substrate is heavily doped with a first polarity type.

24. (New) The method of claim 22, further comprising minimizing the capacitance of the diode electrode structure in accordance with the equation:

$$S \propto A_{eff} \cdot QE_{optimized} \cdot \frac{q}{C_{\min imized}}$$

where S is the sensitivity of a pixel, A_{eff} is the effective photosensitive area of the pixel, QE is the quantum efficiency of the pixel, q is the charge of an electron, and C is the capacitance of the diode structure.

25. (New) The method of claim 22, further comprising applying a bias voltage across the first well and the diode electrode structure.

26. (New) The method of claim 25, further comprising exposing a top surface of the intervening epitaxial material to light.

27. (New) The method of claim 22, wherein the top surface of the intervening epitaxial material forms a continuous area surrounding the electrode structure.

28. (New) The method of claim 22, wherein the intervening epitaxial material is contained within the first well.

29. (New) The method of claim 22, wherein the epitaxial layer is formed on a P+ substrate.

30. (New) A method for forming a highly sensitive vertical imaging structure, comprising:

providing a substrate with one surface heavily doped with a dopant of a first polarity to form one terminal of a vertical diode;

forming an epitaxial layer on the substrate, said epitaxial layer lightly doped with said first polarity type;

in the epitaxial layer, forming a first well extending from the surface of the epitaxial layer into the epitaxial layer and defined by one or more walls and a floor, wherein said floor is spaced from the heavily doped layer in the substrate said first well is more heavily doped with a first polarity type than the epitaxial layer such that an intervening epitaxial material of the first polarity type exists between the adjacent walls of the first well and separates the floor of the first well from the heavily doped layer in the substrate; and

forming a second terminal of the vertical diode structure by forming in the surface of the epitaxial layer a region of a second polarity type that is opposite the first polarity type wherein the second well of the second polarity type formed within the intervening epitaxial material such that a first portion of the intervening epitaxial material is between the electrode structure and the first well and a second portion of the intervening epitaxial material is between the second well and the heavily doped layer in the substrate.